Assembly Manual

EVK Series Prototyping Boards

Revision D

June, 1977

AMI

-- INTRODUCTION --

This manual describes the assembly procedures for kit versions of the EVK Series -- microcomputer prototyping boards for the AMI S6800.

A factory-assembled board is an EVK 300. A complete kit (except that less EPROMs are supplied) is an EVK 200. A kit which omits support for EPROM and PIA usage is an EVK 100. A set containing the circuit board and samples of the S6800 device family is an EVK 99. The circuit board alone is an EVK 98.

All EVKs (except for the EVK 98) are supplied with a 2K-byte ROM containing PROTO, a TTY-oriented debugging monitor. A separately-priced ROM is also available, containing MA/D -- a "direct" or "zero-pass" micro-assembler combined with a disassembler.

The hardware and software design of a running EVK 300 are described in a separate publication, the "Prototyping Board Manual." That book contains schematics, layout guides, and scope photos which are useful during kit assembly.

-- STARTING KIT ASSEMBLY --

All the integrated circuits go into sockets, so leave the IC's in their shipping packages until the rest of the kit has been assembled and checked.

Set aside the big low-force socket. Insert all the other sockets into their numbered positions. Use some cardboard to hold all the sockets in place while you flip the board over for soldering; a record album cover is just the right size.

Place the board on your work surface and slide out the cardboard. Now solder two diagonally opposite pins on each socket. Press down while you're doing this, so each socket will be correctly seated, flush with the board.

Go back and solder all the remaining pins on all the sockets. An unsoldered pin will lead to mysterious problems later, so double-check the integrity and flow at every pin.

Finally, install and solder the low-force socket in Position 46.

-- FINAL STEPS --

Before you install the IC's, connect your +5V power supply to all the +5V and Ground pins on the "A" connector of the EVK. If your power supply has a current limiter, set it to 4 amps, and expect a draw of 3.5 amps for a full load. Use a meter to check for any short circuits in the power paths. No point on the 5V paths should be less than 4.8V from local ground.

Remember to remove all power each time you insert or remove any component. The distinctive mark for Pin 1 always goes in the upper lefthand corner of each socket.

Install only the TTL devices. Check the clock with a scope. Phase 1 is on 16/3 (Socket 16 Pin 3); Phase 2 is on 16/37. Use the variable resistors to bring each phase to approximately 1 microsecond per half cycle.

Install the 4702 in Socket 27. Check the waveform on 27/10 against scope photo #7 in the other EVK manual.

Install the MOS devices, using normal precautions against static damage. Make the Reset Vector Switches (IC 32 and 43) read F000 -- 1111 0000 0000 0000 -- so bringing power up will jump control to PROTO.

From this point, you can use the operating and troubleshooting procedures in the "Prototyping Board Manual."

-- REGISTRATION AND REPAIRS --

Register your board immediately. It is sold with a 90-day warranty on component failures, other than those caused by negligence in handling or assembly.

After the warranty period has expired, AMI must charge for repairs. As of June 1977, the service fee (in U.S. dollars) is $75 for an EVK 100, $125 for an EVK 200 or an EVK 300. This fee includes fault diagnosis, parts replacement, and final checkout on a special tester.

For all EVK matters, address "Microcomputer Services" at one of these locations:

(U.S) American Microsystems, Inc.
3800 Homestead Road
Santa Clara CA 95051

(U.K.) AMI Microsystems, Ltd.
108A Commercial Road
Swindon, Wiltshire

(Japan) AMI Japan, Ltd.
Daiwa Bank Building
1-6-21, Nishi-Shimbashi
Minato-ku, Tokyo 105

-- CONSTRUCTION TABLES --

The board is divided into functional sections, and the components are grouped by those sections:

Clock
Reset
Interval Timer
MPU and Buffers
Restart
Decoding
Memory
I/O
TTY Interface
EPROM Programmer

Resistors, unless otherwise noted, are carbon film, 1/4 watt, 5%. Values are specified in ohms.

Capacitors, unless otherwise noted, are ceramic disks, rated for at least 6 volts. Values are specified in microfarads.

Within each section, part number prefixes follow this order:

R	Resistor
C	Capacitor
RP	Resistor Pack
CR	Diode
IC	Integrated Circuit or Dual In-Line Package
Q	Transistor

These special indicators may appear after a part number:

*	EVK 200 only
+	EVK 100 only
@	Not supplied with a kit

-- DISCRETE COMPONENTS --

Orient the board, face up, so that it matches the close-up photos in this manual. As you proceed with assembly, compare your work against both the photos and the layout guide in the other manual. Follow the Construction Tables given later, and finish one section at a time.

Install and solder resistors first. Save some long clipped leads for later use as jumpers. Then put in all the diodes. A reversed diode will be hard to find and repair later, so check orientation. Each diode position has a bar-and-triangle symbol; the bar matches the striped end of the diode, and the triangle matches the other end.

Solder in the capacitors. Each tantalum capacitor -- a silver cylinder -- has a "+" end which must match the board marking.

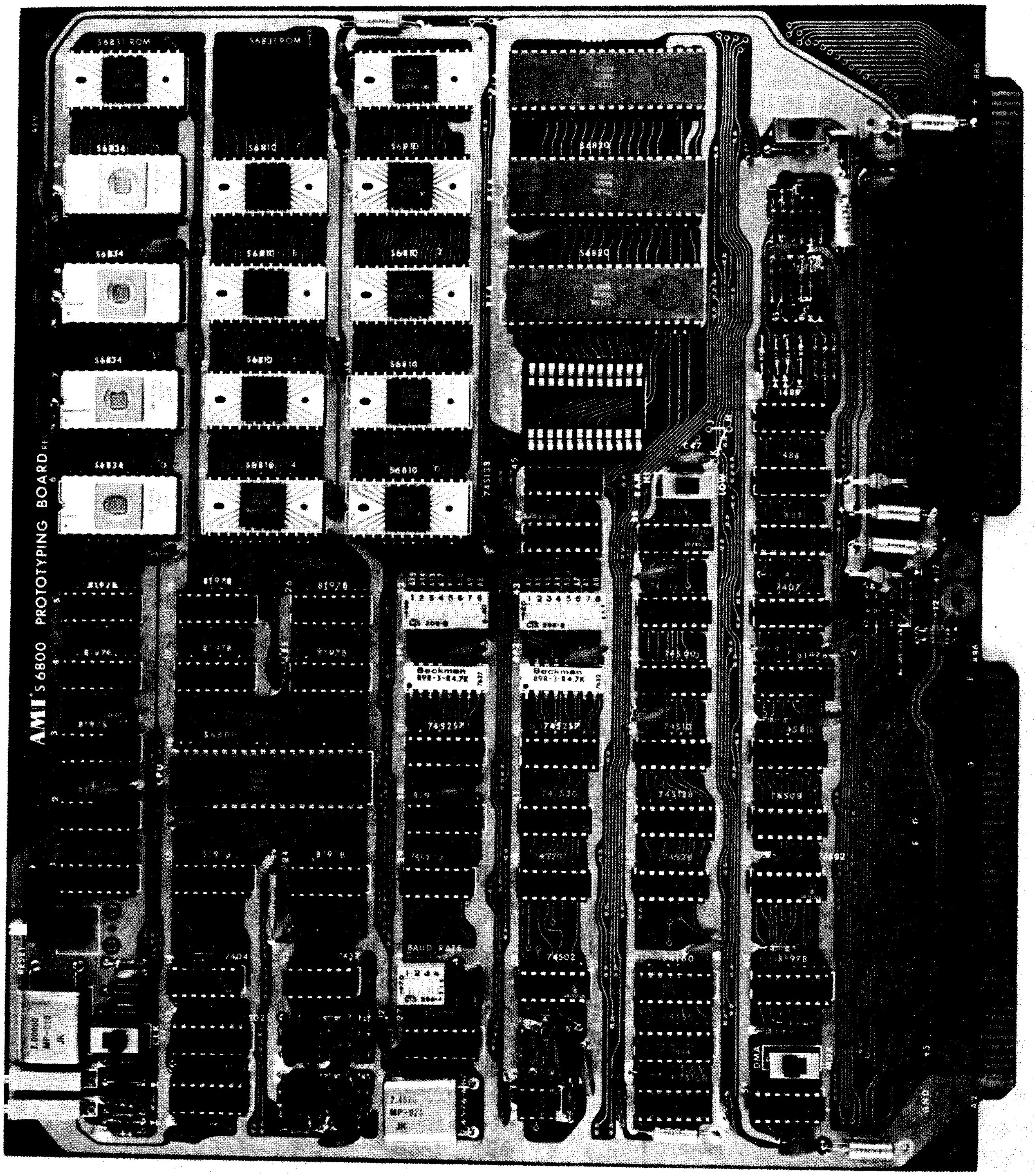
The one or two crystals in your kit will need their leads bent for horizontal mounting, as shown in the photos. Match the frequency on the case to the board marking.

The curved and flat edges of each transistor are shown on the board. Be careful; unsoldering and resoldering a transistor may ruin it.

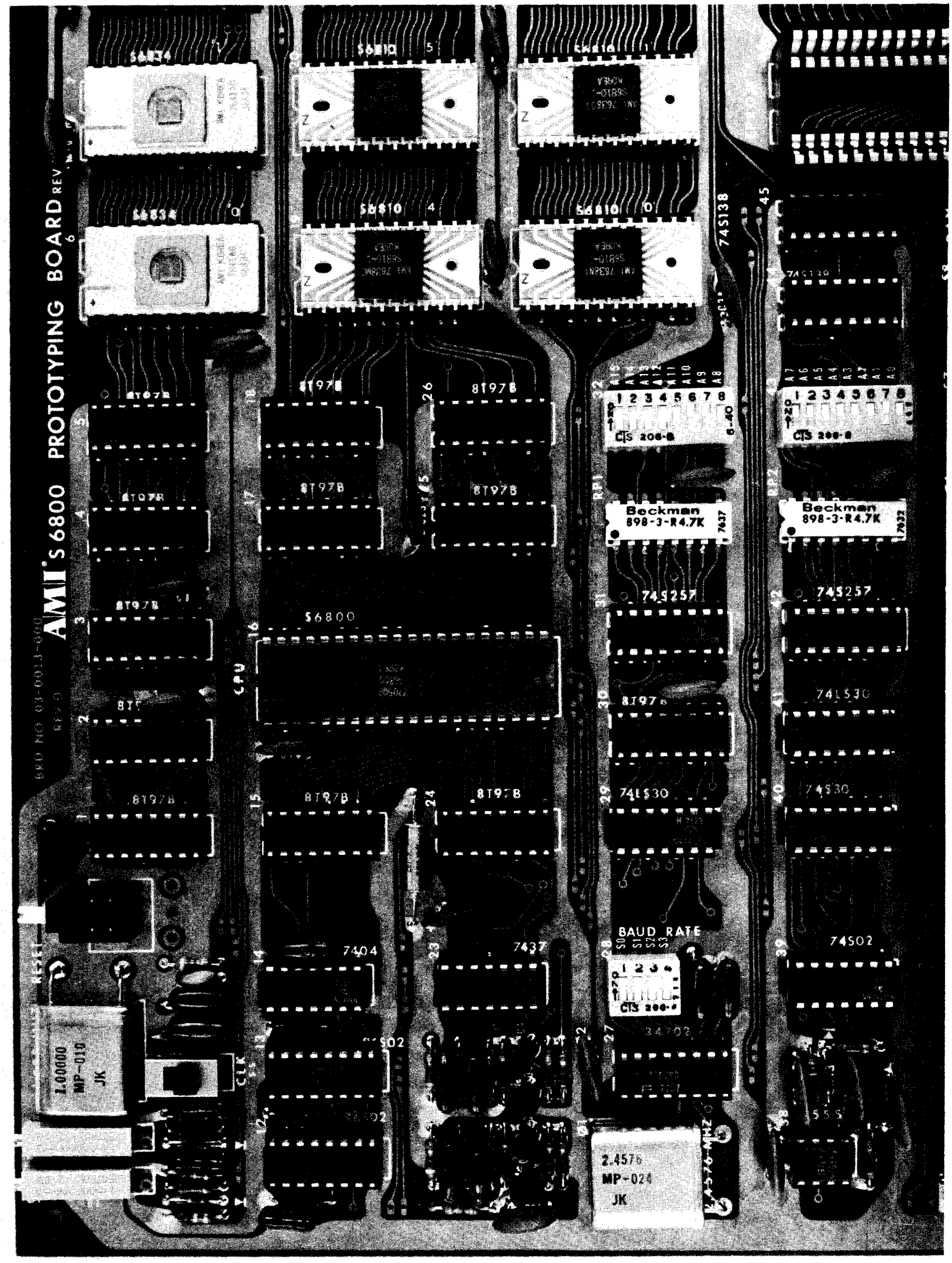
Now install the switches or jumpers, the variable resistors, and any custom circuit changes you need.

Double-check and triple-check your work. Use a magnifying glass. Almost every board sent back to AMI for repairs has either a poor solder joint or a reversed component.

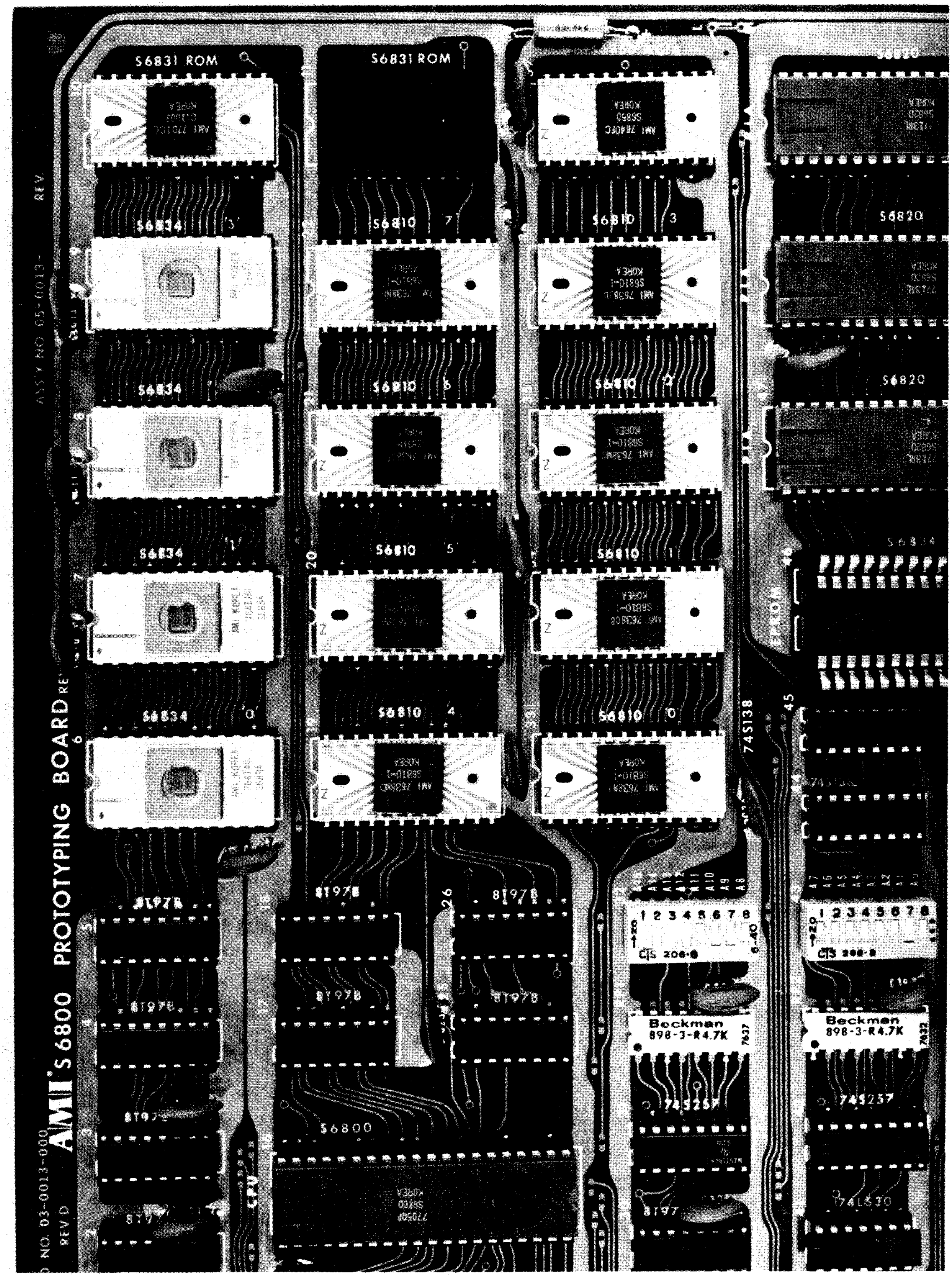
Check for too much solder as well as too little -- for a "bridge" between two paths. Similarly, watch for a lead not clipped short enough, so that it bends over and touches a board circuit.



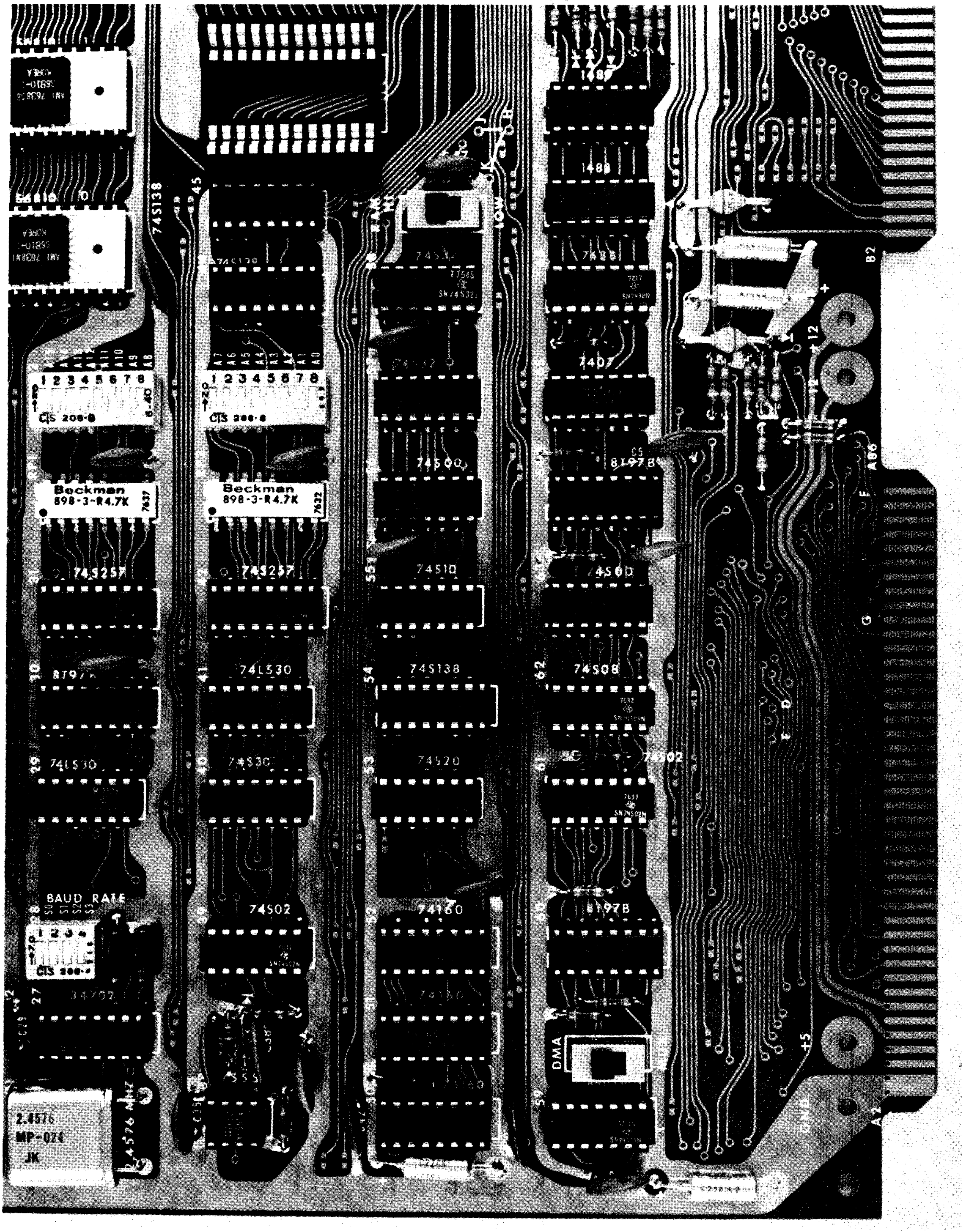
COMPLETED EVK 300 (REVISION D)



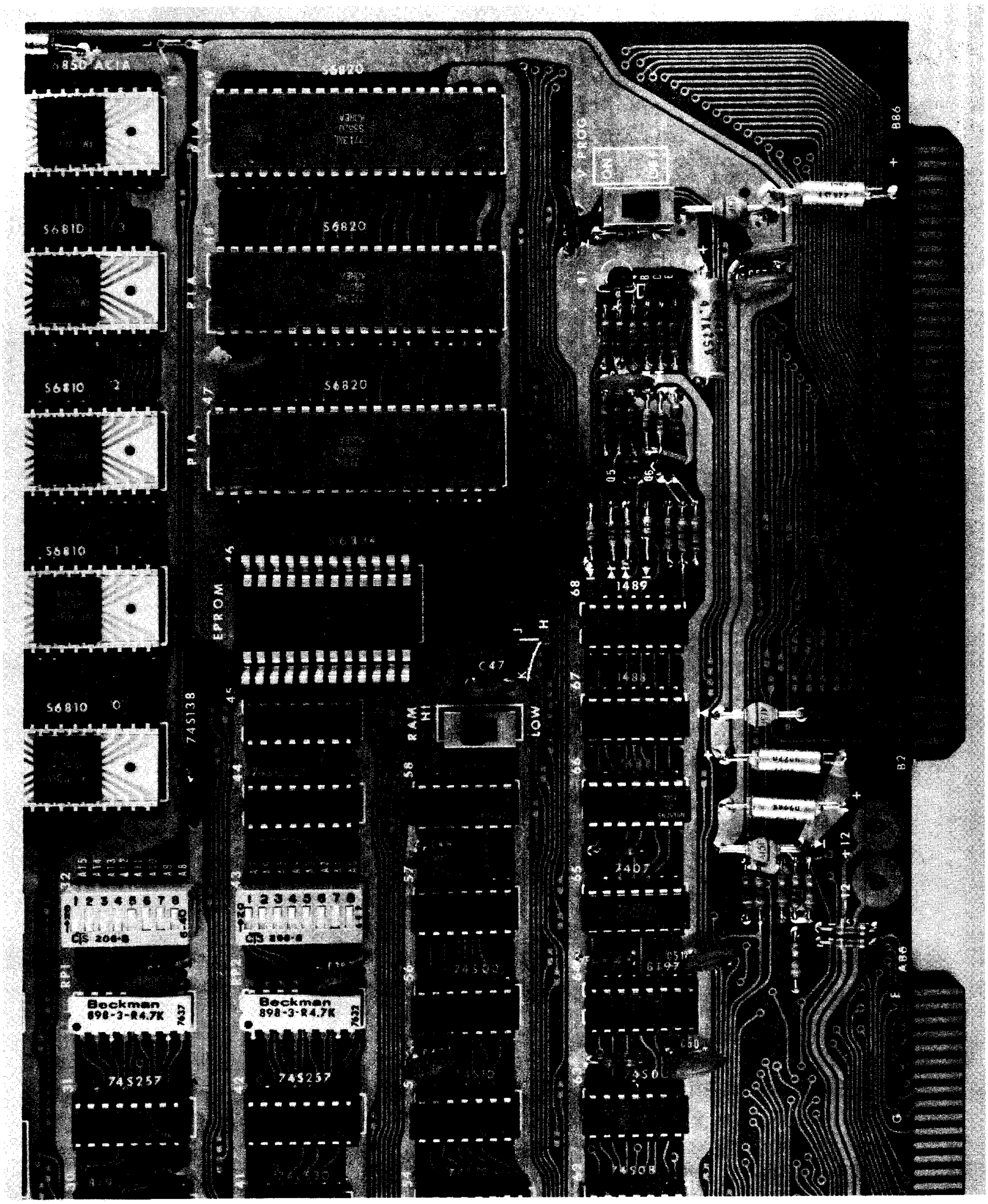
UPPER LEFT SECTION (REVISION D)



UPPER RIGHT SECTION (REVISION D)



LOWER LEFT SECTION (REVISION D)



LOWER RIGHT SECTION (REVISION D)

-- CLOCK --

R1		Variable to 20K, 15 turn
R2		Variable to 20K, 15 turn
R3		100K (brown-black-yellow)
R4		1.5K (brown-green-red)
R5		100K (brown-black-yellow)
R6		1.5K (brown-green-red)
R7		1K (brown-black-red)
R8	*	1.5K (brown-green-red)
R9	*	470 (yellow-violet-brown)
R10	*	470 (yellow-violet-brown)
R11		4.7K (yellow-violet-red)
R12	*	150K (brown-green-yellow)
R13		3.3K (orange-orange-red)
R14		470 (yellow-violet-brown)
R15		4.7K (yellow-violet-red)
R16		4.7K (yellow-violet-red)
R17		1K (brown-black-red)
R18		33 (orange-orange-black)
R19		51 (green-brown-black)
R20		470 (yellow-violet-brown)
R21		4.7K (yellow-violet-red)
R22		4.7K (yellow-violet-red)
R23		1K (brown-black-red)
R24		22 (red-red-black)
R25		51 (green-brown-black)

C1		Mica, 270pf, 500V
C2	*	Mica, 100 pf
C3	*	Mica, 470 pf, 500V
C5	*	.01
C14		Mica, 270 pf, 500V
C15	*	Mica, 100 pf
C17		Mica, 8pf
C18		Mica, 8pf
C19		Mica, 8pf
C20		Mica, 8pf
C60		.1
CR1		1N914
CR2		1N914
IC12		96S02 Dual One-Shot
IC13	*	96S02 Dual One-Shot
IC14		7404 Hex Inverter
IC23	*	7437 Quad 2-Input NAND Buffer
Q1		2N5772
Q2		2N5771
Q3		2N5772
Q4		2N5771
XTAL	*	1.000 MHz
SWITCH	*@	SPDT Slide, in CLK box
JUMPER	+@	Center to "ss" in CLK box

-- RESET --

R26	1M (brown-black-green)
R27	1M (brown-black-green)
R28	100K (brown-black-yellow)
R58	4.7K (brown-black-red)
C21	.1
C29	.1
C30	Mica, 56pf
C31	Mica, 56pf
C35	.1
C36	.47
C37	.1
C38	.1
CR13	1N914
IC27	4702 Baud Rate Generator
IC28	DIP Switch, 4 Positions
IC38	555 Voltage Controlled Oscillator
IC39	74S02 Quad 2-Input NOR
XTAL	2.4576 MHz
SWITCH	Momentary, in RESET box

-- INTERVAL TIMER --

R30	1K (brown-black-red)
R31	4.7K (yellow-violet-red)
R32	4.7K (yellow-violet-red)
R33	4.7K (yellow-violet-red)
C41	22 microfarad, 15V
C42	.1
C43	.1
C44	.1
C45	.1
C48	.1
C49	22 microfarad, 15V
IC50 *	74160 Asynchronous Decimal Counter
IC51 *	74160 Asynchronous Decimal Counter
IC52 *	74160 Asynchronous Decimal Counter
IC59	74S10 Triple 3-Input NAND
IC60	8T97B Hex TRi-state Buffer
SWITCH *@	SPDT Slide, in DMA box
JUMPER +@	Center to "norm" in DMA box

-- MPU AND BUFFERS --

C6 * Mica, 200pf

C7 .1

C8 .1

C16 .1

C22 Tantalum, 22 microfarad, 15V

C23 .1

C32 .1

IC16 AMI S6800 Microprocessor

IC1, IC2, IC3, IC4
8T97B Hex Tri-state Buffer

IC5, IC15, IC17, IC18
8T97B Hex Tri-state Buffer

IC24, IC25, IC26, IC30
8T97B Hex Tri-state Buffer

-- RESTART --

C33	.1
C39	.1
RP1	4.7K, 8 Resistors
RP2	4.7K, 8 Resistors
IC29	74LS30 8-Input NAND
IC31	74S257 Quad 2-Bit Multiplexer
IC32	DIP Switch, 8 Positions
IC41	74LS30 8-Input NAND
IC42	74S257 Quad 2-Bit Multiplexer
IC43	DIP Switch, 8 Positions

-- DECODING --

R29	3.3K (orange-orange-red)
R34	4.7K (yellow-violet-red)
R35	4.7K (yellow-violet-red)
R36	3.3K (orange-orange-red)
R37	120 (brown-red-brown)
R38	4.7K (yellow-violet-red)
R39	4.7K (yellow-violet-red)
R40	4.7K (yellow-violet-red)
R41	2K (red-black-red)
R42	3.3K (orange-orange-red)
R56	4.7K (yellow-violet-red)
R57	4.7K (yellow-violet-red)
R59	3.3K (orange-orange-red)

C45	.1
C46	.1
C47	.1
C50	.1
C51	.1
C55 *	Tantalum,.22 microfarad, 15V
C56 *	Tantalum, 22 microfarad, 15V

CR10	A15F

-- MEMORY --

C9 .1

C10 * .1, 16V

C11 * .1, 16V

C12 .1

C13 * .1, 16V

C24 .1

C25 .1

C26 .1

C34 .1

IC10 AMI S6831-001 ROM, marked C11003 (PROTO)

IC11 @ AMI S6831-002 ROM, marked C10224 (MA/D)

IC19, IC20, IC21, IC22

AMI S6810-1 RAM

IC33, IC34, IC35, IC36

* AMI S6810-1 RAM

IC6 * AMI S6834 EPROM

IC7, IC8, IC9

*@ AMI S6834 EPROM

IC40	74S30 8-Input NAND
IC44	74S138 3-to-8 Decoder
IC45	74S138 3-to-8 Decoder
IC53	74S20 Dual 4-Input NAND
IC54	74S138 3-to-8 Decoder
IC55	74S10 Triple 3-Input NAND
IC56	74S00 Quad 2-Input NAND
IC57	74S32 Quad 2-Input OR
IC58 *	74S32 Quad 2-Input OR
IC61	74S02 2-Input NOR
IC62	74S08 Quad 2-Input AND
IC63	74S00 Quad 2-Input NAND
IC64	8T97B Hex Tri-state Buffer
IC65	7407 Hex Open Collector Driver
IC66	7438 Quad 2-Input NAND Open Collector

SWITCH *@	SPDT Slide, in RAM box
JUMPER +@	Center to "HI" in RAM box

-- I/O --

C27 .1

C28 Tantalum, 22 microfarad, 15V

C40 * .1

IC37 AMI S6850 ACIA

IC47 * AMI S6820 PIA

IC48 * AMI S6820 PIA

IC49 * AMI S6820 PIA

IC68 1489A RS-232 Receiver

-- TTY INTERFACE (EVK 100 ONLY) --

R43	2K (red-black-red)
R44	510 (green-brown-brown)
R45	150 (brown-green-brown)
R46	1.5K (brown-green-red)
R47	1K (brown-black-red)
R48	1K (brown-black-red)
R49	100 (brown-black-brown)
C52	.1
C54	.1
C59	Tantalum, 22 microfarad, 15V
CR3	1N4003
CR4	1N4003
CR5	1N4003
CR6	1N4003
CR7	1N4003
CR8	1N4003
Q5	2N3563
Q6	2N4402

-- TTY INTERFACE AND EPROM PROGRAMMER (EVK 200 ONLY) --

R43	2K (red-black-red)
R44	510 (green-brown-brown)
R45	150 (brown-green-brown)
R46	1.5K (brown-green-red)
R47	1K (brown-black-red)
R48	1K (brown-black-red)
R49	100 (brown-black-brown)
R50	1K (brown-black-red)
R51	1K (brown-black-red)
R52	10K (brown-black-orange)
R53	1K (brown-black-red)
R54	22K (red-red-orange)
R55	10 (brown-black-black)

C52	.1
C53	Tantalum, 4.7 microfarad (4.7Kpf), 75V
	-- large silver cylinder; markings may not include value
C54	.1
C57	.1, 16V
C58	.1, 16V

C59	Tantalum, 22 microfarad, 15V

CR3	1N4003
CR4	1N4003
CR5	1N4003
CR6	1N4003
CR7	1N4003
CR8	1N4003
CR9	1N4003
CR11	A15F
CR12	A15F
IC67	1488 RS-232 Driver
Q5	2N3563
Q6	2N4402
Q7	2N5400
Q8	MJE340
	-- Dot marks Emitter; metal faces resistors

SWITCH @ SPDT Slide, to the left of V PROG box

[End of Construction Tables]